

dependents of these Chiefs who are very numerous assume the names of their masters (besides their own proper name) and use it as was customary amongst the Scottish clans.

Each of these no doubt decides differences and distributes justice in their several districts. . . . Whether it be from that mode of government or some other policy to which we are strangers, it does not appear that any civilis'd nations have as yet exceeded them in the great order they observe on all occasions and ready compliance with the commands of their chiefs, nor in the harmony that subsists throughout all ranks and unites them as if one man inform'd with and directed by the same principle.

This, then, is the essential clue to the understanding of chieftdom society and through it to an explanation of the early monuments of Britain. Human originality, and the creative capacity of human societies, albeit with a simple technology, should never be underrated, whether they border the Atlantic or lie in the Pacific. [1978]

Acknowledgements

My experience of modern Polynesian society is based on a voyage made in the agreeable company of Messrs David Collison, Roy Henman, Magnus Magnusson, David South and John Tellick, which also owed much to the encouragement of the late Paul Johnstone. In Tonga we were aided by the personal interest of HM King Taufa'ahau Tupou IV, and in Makave I am much indebted to the hospitality and friendship of the Hon. Tu'i'afitu, his wife Luisa and son Niulala and to the help of Mr Epele Kauvaka. I should like to acknowledge the assistance and advice on Easter Island of Mr Sergio Rapu and Professor and Mrs William Ayres.

MONUMENTS, MOBILISATION AND
SOCIAL ORGANISATION IN
NEOLITHIC WESSEX

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THE STRUCTURE OF Neolithic societies in Western Europe may have been a great deal less egalitarian than the lack of differentiation in their artifacts might lead us to believe.

(R. J. C. Atkinson 1961, 299)

The principal recorded sites of the neolithic period of south Britain are monumental: either funeral mounds sometimes more than 300 ft long, or circular enclosures, with a bank and internal ditch, frequently more than 100 ft in diameter. We know much less of settlement sites, or of more modest burial conventions. Yet the artefacts found are unimpressive: simple pottery, bone and stone tools, and some handsome axes, often of imported stone (Piggott 1954). Explanations are needed for the monuments of prehistoric Britain, and indeed many writers have stressed that both the 'causewayed camps' of the early neolithic, and the 'henges' of the later neolithic are almost uniquely British features. They can be discussed most profitably in local terms.

The changes for which some explanation is here desired are those seen in the neolithic of south Britain, and specifically in Wessex (Wiltshire and Dorset) which resulted in the construction of these monuments. In the first place there are the long burial mounds or 'barrows', generally earthen, of the early neolithic period. At the same time as those, probably before 4000 BC in calendar years, causewayed enclosures were constructed. Then, possibly later in the earlier neolithic period, there are the remarkable 'cursus' monuments – earthen banks sometimes running for several miles, and bounded by parallel ditches about 300 ft apart.

Later in the neolithic, in the third millennium BC (in calendar years), very large henge monuments were constructed, of which

Avebury is the most famous. Around the end of the later neolithic there were two prodigious building feats in this region – the construction in earth and chalk of the huge conical mound, Silbury Hill, which was at least three times the volume of the fluted ‘pyramid’ of the Olmecs at La Venta (cf. Heizer and Drucker 1968, 52), and, a little later, the erection of the great sarsen structure at Stonehenge.

The difficult general question as to what constitutes an adequate ‘explanation’ for such changes and achievements will not be touched on here. It will be considered sufficient if the explanation or hypothesis:

- i) offers a framework in which the changes seem more intelligible
- ii) gives rise to logical consequences which can be tested in subsequent work.

Chieftdoms in neolithic Wessex

The explanatory model used here is a social one. It unites previous suggestions as to the function of some of the monuments and the organization of their construction. But as we shall see it goes further in relating their distribution to these other ideas, as well as to observed specialization in trade and religious practice.

Already six years ago, Isobel Smith (1965, 19) rejected some earlier views about the ‘causewayed camps’, and elaborated a suggestion first made by Stuart Piggott (1954, 29) and Richard Atkinson (cf. 1962, 215), that ‘the enclosure may have served as a centre or rallying-point for the population of a fairly wide area’.

Such rallying points play an essential role in the lives of some contemporary communities living in a comparable stage of economic and technological development. Assembly of the scattered families or tribal units takes place at one or more intervals during the year, at the slack periods in the agricultural and/or stock-tending cycle, and affords opportunities for the transaction of the necessary business of tribal life. In addition to those matters which may come within the political field in its broader sense, such other matters can be attended to as the holding of initiation ceremonies, matchmaking and weddings, the exchange of stock and seed-corn and perhaps of more durable goods. Rites and ceremonies are performed to ensure the fertility of the flocks and herds and the growing of the corn, and finally to celebrate the harvest. Communal feasts are an inevitable accompaniment of such occasions, and some industrial activities may be undertaken, either because they are less tedious when performed to the accompaniment of a lively

exchange of news and gossip, or because there is insufficient time at other seasons.

Miss Smith’s further suggestion (1966, 474) that there was a connection and a similarity in function between the early neolithic causewayed enclosures and the later neolithic henges has been discussed by Geoffrey Wainwright in the light of his recent discovery of wooden buildings in some of the larger henges. He compared these to the council houses of the Creek and Cherokee Indians of the south-eastern United States and concluded that their function was communal rather than domestic (Wainwright 1970, 38).

This useful discussion of the function of such monuments is supplemented by Atkinson’s stimulating reflections on the social organization which produced Stonehenge (1960, 166):

The building of Stonehenge is . . . unlikely to have been the expression of the common will, but rather the fulfilment of a purpose imposed from above. Now in the rich and martially furnished Wessex graves we can admittedly see evidence of chieftainship, and the grouping of the graves in cemeteries may imply whole dynasties of chiefs. Yet the pattern of society which they represent is surely that of so many other heroic societies, in which clan wars with clan, and rival dynasties carry on a perpetual struggle for power. Under such conditions, can the construction of Stonehenge, involving the displacement of so many hundreds of men from their homes for so long, have been attempted, still less achieved? Surely not; for such great works can only be encompassed by a society at peace within itself. And in such a society of conflicting factions, how is peace imposed except from above?

I believe, therefore, that Stonehenge itself is evidence for the concentration of political power, for a time at least, in the hands of a single man, who alone could create and maintain the conditions necessary for this great undertaking.

It is not necessary to agree with all of this to see that it does pose questions which in general have been much neglected. One point at present in doubt is whether the final structure of Stonehenge was in fact constructed during the rich Wessex early bronze age, of which Atkinson writes, or in an earlier period, as Christopher Hawkes has recently suggested. Nor is Atkinson’s notion of chiefly society very much like the one to be presented here. It is, rather, his realization of the social organisation involved in the investment of so much labour which is relevant. The same applies now to Silbury Hill,

which a recent radiocarbon date would place as the contemporary or immediate senior of the pyramids of Egypt, just before 2500 BC in calendar years.

It is proposed here that the developments in neolithic Wessex be explained in terms of a developed social stratification in the society, resulting in the formation in or before the late neolithic period of what a number of American anthropologists have recently termed 'chiefdoms'. I am aware that this is now a fashionable concept, of limited meaning when used loosely, and yet have found it particularly apposite in the early bronze age Aegean (Renfrew 1972, chapter 18), a society paradoxically different, in many ways, from neolithic Britain.

Yet the old tripartite social classification of band/savagery, tribe/barbarism and state/civilization is no longer adequate to our needs. Between the relatively egalitarian tribal society which we may imagine for some early neolithic cultures of Europe – Starčevo perhaps, or Danubian I – and the civilizations of Crete, Mycenae, Classical Greece or Rome, there lies a considerable gap. In this same gap fall the stratified societies of Polynesia – which in Easter Island, Hawaii, Tonga, the Marquesas and elsewhere, likewise produced very impressive and large-scale monuments, illustrated in chapter 7 – and some of the tribes of the south-eastern United States, as well as many others.

This concept of chiefdom arose partly from Paul Kirchhoff's notion of 'conical clan', and Raymond Firth's analysis of the 'ramages' of Polynesia. As Morton Fried put it (1957, 1): 'One of the classic tasks in the quest for regularity is an attempt to derive the correlations of specific social institutions with other aspects of culture . . . The main concern is with the relations of social structure and economy'. The term has been well discussed by Elman R. Service (1962, 142–77) and Marshall D. Sahlins (1968). A chiefdom is a ranked society, hierarchically arranged, sometimes in the form of a conical clan where the eldest descendant in the male line from the clan founder ranks highest, and the cadet branches are ranked in seniority after the main line (see p. 204).

Chiefdoms are particularly distinguished from tribes by the presence of centres which coordinate economic, social and religious activities . . . The great change at chiefdom level is that specialization and redistribution are no longer merely adjunctive to a few particular endeavours, but continuously characterize a large part of the activity of the society. Chiefdoms are *redistributional societies* with a permanent central

agency of coordination. Thus the central agency comes to have not only an economic role – however basic this factor in the origin of this type of society – but also serves additional functions which are social, political and religious. Once it is in existence, it can in other words, act to foster and preserve the integration of the society for the sake of integration alone. (Service 1962, 143)

The proposal, then is that this affords an appropriate model for the late neolithic of Wessex. The following are brought out by Service and Sahlins as frequent features of chiefdoms, in addition to the defining ones of 1) a ranked society and 2) the redistribution of produce organized by the chief:

- 3) greater population density
 - 4) increase in the total number in the society
 - 5) increase in the size of individual residence groups
 - 6) greater productivity
 - 7) more clearly defined territorial boundaries or borders
 - 8) a more integrated society with a greater number of socio-centric statuses
 - 9) centres which coordinate social and religious as well as economic activity
 - 10) frequent ceremonies and rituals serving wide social purposes
 - 11) rise of priesthood
 - 12) relation to a total environmental situation favouring specialization in production (and hence redistribution) – i.e. to some ecological diversity
 - 13) specialization, not only regional or ecological but also through the pooling of individual skills in large co-operative endeavours
 - 14) organization and deployment of public labour, sometimes for agricultural work (e.g. irrigation) and/or for building temples, temple mounds or pyramids
 - 15) improvement in craft specialization
 - 16) potential for territorial expansion – associated with the 'rise and fall' of chiefdoms
 - 17) reduction of internal strife
 - 18) pervasive inequality of persons or groups in the society associated with permanent leadership, effective in fields other than the economic
 - 19) distinctive dress or ornament for those of high status
 - 20) no true government to back up decisions by legalized force.
- The strength of the model is that it implies the conjoint occurrence

of many of these features. We shall see that many are well documented in neolithic south Britain, while some others are conspicuously lacking.



Figure 1. The principal groups of neolithic long barrows in Dorset and Wiltshire, as listed by Ashbee (1970).

Long Barrows and Territories of Individual Settlements

There are some 120 long barrows known from Wiltshire and Dorset (listed by Ashbee 1970). Most of them are of earth or chalk, sometimes covering the traces of a wooden 'mortuary house'. While in some cases this may have been accessible after the construction of the mound, it will not have stood for more than a couple of decades. After this the barrow was effectively 'unchambered'. There are in this area a number of barrows containing a stone chamber, which certainly was accessible for much longer, and may have been more expensive of labour to construct. For convenience they are included here with the more numerous 'unchambered' barrows.

Grinsell (1958, maps 1 to v) and others have emphasized how the prehistoric remains of Wessex cluster on the chalklands – the Marlborough Downs, the Salisbury Plain, Cranborne Chase and the Dorset Downs (figure 1). Ashbee has divided the Wessex barrows into five groups, corresponding to these topographic divisions, with separate groups for the east and west Salisbury plain. This is supported by an elementary isarithmic approach, and doubtless could be substantiated by other means, although the east and west Salisbury Plain groups are not well separated.

It has long been recognized that the long barrows sometimes occur in groups of two or three. There is a noted concentration in the region near Stonehenge (which was not itself begun, however, until later), and some lineation along chalk uplands in Cranborne Chase. But in the west Salisbury Plain at least, the spacing is such as to suggest that each barrow (or pair) may have been located in its own individual territory. Even accepting that some barrows have been destroyed, this is made plausible by the simple construction of Thiessen polygons (figure 2; cf. p.183).

An important underlying assumption here is that all the barrows must have been functioning in some sense, although not necessarily for burial, at the same time – no doubt at the end of the early neolithic period – for such a conclusion to be valid. Atkinson has, by implication, suggested the contrary (Atkinson 1968), and his argument must be considered. He points out that on average six bodies only have been found within long barrows, and assumes that long barrows were being built over a period of ten centuries. His conclusion was that if the entire population was buried in such barrows, each barrow could have served a family of about six for about 25 years. On this model the population would be very small, and families would be moving from place to place, so that the ultimate

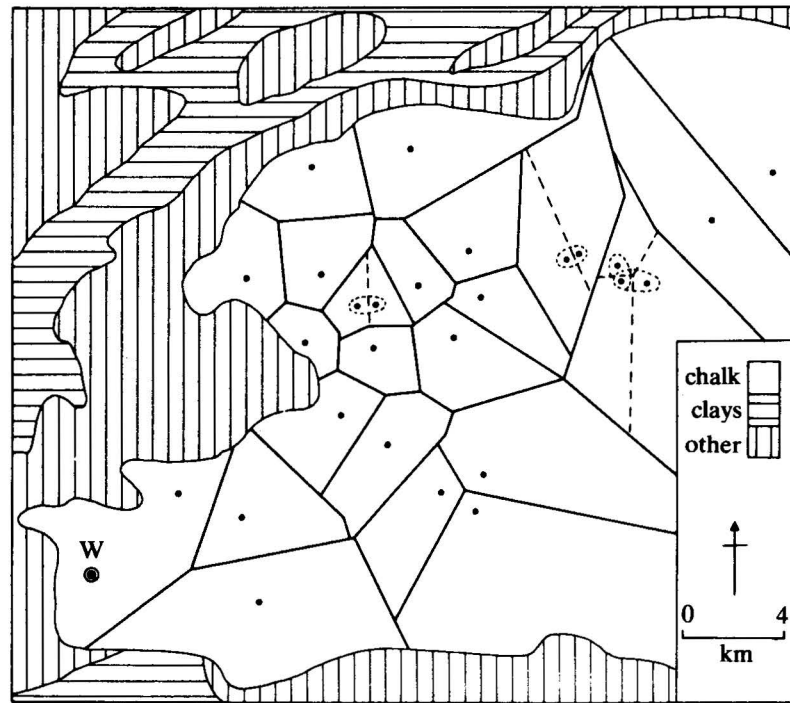


Figure 2. Locations of neolithic long barrows (indicated by dots) on the chalklands of the west Salisbury Plain, south Britain. By drawing unweighted Thiessen polygons the chalkland has been divided into 'territories', each with one barrow. (W indicates the enclosure at Whitesheet Hill.) Data from Grinsell (1958) and Ashbee (1970).

distribution of barrows would reflect their wanderings, and in no sense the situation at any point in time. The notion of barrows reflecting territories would be inadmissible.

However it is possible to counter that this argument sets the population impossibly low. A single family of six and their descendants, assuming the population did not increase, would, in 1,000 years, given 25 years per generation, produce 240 dead, requiring (at 6 per barrow) 40 barrows. The barrows of Wessex would thus be the result of three families over this period. A mean population for early neolithic Wessex of 18 persons in more than 3,000 km² seems, however, too small – less than 0.01 per km².

The inescapable alternative is that only some of the dead were

buried in long barrows, and the others were disposed of by means which have left no trace, as is common in many communities. Indeed the practice of excarnation by exposure may well have operated for those whose bones were later interred in the barrows, since the remains were often altogether disarticulated. The barrow was used only for a few decades and then closed. But it would still have been an impressive monument subsequently, and a possible focus for the religious life of the community.

It is possible that agriculture at this time was on a system of shifting cultivation. Soudsky (1968) has described such a system in the loess lands of Czechoslovakia, where a community of about 125 persons occupied a total area of 2 km², shifting the location of the village every 15 years to one of four or five sites, and returning after 60 years or so at the beginning of a new cycle. Something of the same, initially in forest clearings, may be envisaged in Wessex, although the groups may have been smaller – from 20 to 100 persons. The territories of roughly 10 km² seen in figure 2, giving (on this hypothetical assumption) a total land area of 10 to 50 hectares per person should certainly have been adequate. The long barrow would be a permanent feature of the territory.

Ashbee has calculated that the Fussell's Lodge long barrow required 5,000 man hours in its construction, or 500 man days. This is not a large figure and implies no supra-territorial organisation. No doubt the lineage in one territory might aid its neighbour in return for a good feast – and feasting was certainly part of the funeral ritual (Piggott 1954, 60). Such limited cooperation is known from many parts of the world in essentially egalitarian societies – 'family-oriented cooperative projects which are paid for in food given to the workers' (Heizer 1966, 828). It is not clear why only a favoured few should be buried in such a way, yet if the territorial argument is accepted, there were factors favouring the construction of a single barrow in each territory. In other words the existence of a barrow may have been a requirement of the community for social or religious reasons, rather than primarily a means of disposal of the dead. I am not aware of ethnographic parallels for the construction of such a monument soon after the colonization of new land, but perhaps they exist. Certainly the land surface beneath the South Street long barrow (Fowler and Evans 1967), as well as showing unexpected signs of ploughing, suggested only two clearances, separated by at least ten years, prior to its construction.

Larger Monuments and Chieftain Territories

The different classes of neolithic monument in Wessex may be said to form a kind of hierarchy in terms of the manpower involved in their construction. It runs as follows.

i) 10,000 man hours or less. Early neolithic unchambered long barrows. Barrows with stone chambers might take more than 5,000 hours, but could still be of this order.

ii) About 100,000 man hours. Early neolithic causewayed enclosures. I estimate, using the formula proposed by Atkinson (1961, 295), that the ditches and banks at Windmill Hill represent about 120,000 hours.

iii) About 1 million man hours. The major henge monuments, of diameter greater than 600 ft, of which five are known in Wessex (Wainwright 1969; Burl 1969), Wainwright (1970, 30) estimates 1.5 million man hours for Avebury and 0.9 million for Durrington Walls.

iv) Over 10 million man hours. Silbury Hill and the completed cursus monuments (Dorset and Stonehenge cursus). Atkinson estimates a volume of 6.5 million ft³ of earth for the Dorset cursus (1955, 9) which might suggest 9 million man-hours for its construction. He kindly indicates (personal communication) that he would tentatively estimate the minimum labour input for Silbury Hill at about 18 million man-hours. He makes also the important observation that, once begun, the process of construction was continuous, even though there were changes of plan.

v) Over 30 million man-hours. Possibly Stonehenge III. Atkinson has estimated that the transport of the 81 sarsen stones for the final structure of Stonehenge, over a distance of 24 miles, would have taken 30 million man hours. The labour of dressing the stones is assessed at a further 500,000 hours, to which must be added the considerable effort of erecting the stones. If the recent suggestion be followed, however, that the stones of Stonehenge were transported to the Salisbury Plain by glacial action, the labour requirement for transport might be considerably reduced, and the labour involved in Stonehenge III might be no more, or indeed less, than that required for Silbury Hill.

This hierarchy of effort for the causewayed enclosures and long barrows is matched by one of distribution. Each of the areas of long barrows already distinguished has a single causeway camp (although the Marlborough Downs for some reason have three; figure 3.)

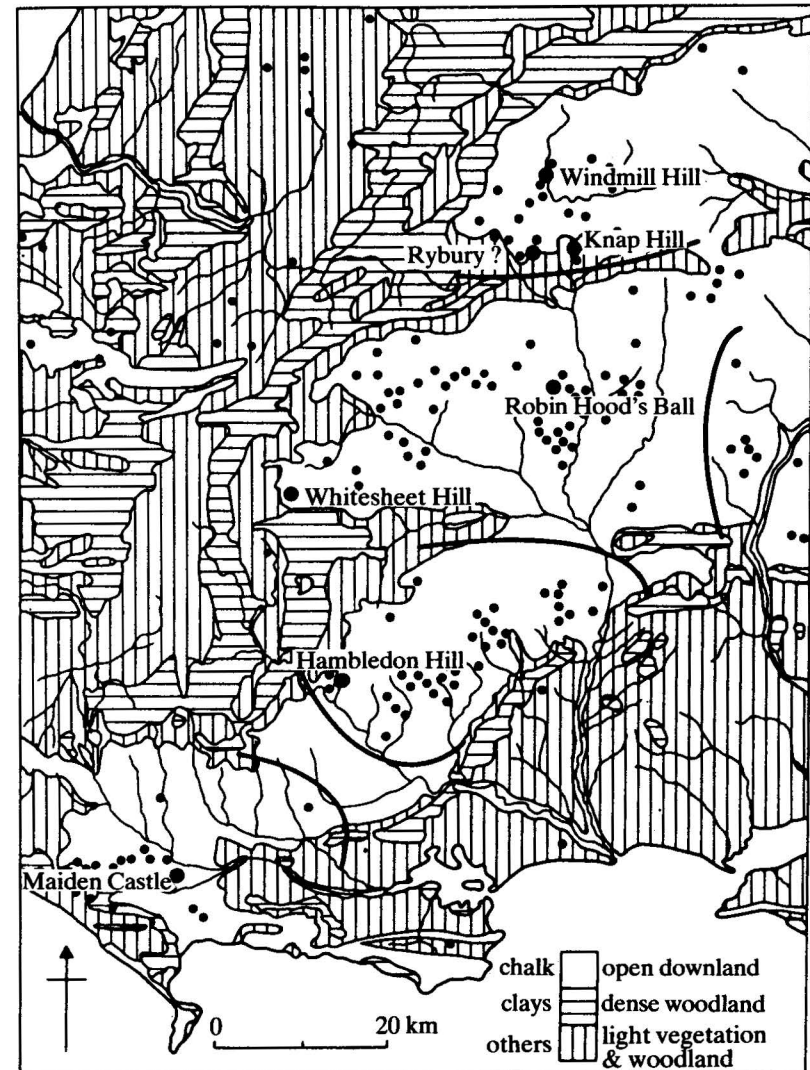


Figure 3. The neolithic causewayed enclosures of Dorset and Wiltshire in relation to the long barrows. Note that each of Ashbee's barrow groups is served by an enclosure.

Region	Total no. of long barrows (stonebuilt barrows in brackets)	Causewayed enclosures
Dorset Downs	20 (4)	Maiden Castle
Cranborne Chase	35 (0)	Hambledon Hill
West Salisbury Plain	27 (0)	Whitesheet
East Salisbury Plain	29 (0)	Robin Hood's Ball
Marlborough Downs	21 (16)	Windmill Hill
		Rybury
		?Knap Hill

If we accept that stone-built barrows involved more labour than earthen ones, the long barrow/camp ratio on the Marlborough Downs is partly explained. Two camps (Hambledon Hill and Whitesheet) lie at the western extreme of their chalkland, but they may well have included within their territory some of the clay and oolite lands to the west.

It is particularly interesting that this territorial division seems to persist into the later neolithic period, although the building of long barrows and the construction of causewayed camps had by then ceased. There are ten henge monuments in Britain with a diameter greater than 600 ft. Five of them are in Wessex. They related closely to the previous territories, and to the causewayed camps (cf. Smith 1971; figure 4).

Region	Henge	Diameter of henge (feet)	Former causewayed enclosure	Max. diam. of causewayed enclosure (ft)
Dorset Downs	Mount Pleasant	1200	Maiden Castle	1200
Cranborne Chase	Knowlton South	750	Hambledon Hill	1050
Salisbury Plain	Durrington Walls	1720	Robin Hood's Ball/Whitesheet	750/640
Vale of Pewsey	Marden	1700	Knap Hill/Rybury	650/520
Marlborough Downs	Avebury	1390	Windmill Hill	1270

The causewayed camp at Knap Hill, already noted as anomalous, does not find a corresponding major henge. Nor does Whitesheet, its territory apparently uniting with the east Salisbury Plain. The land which it may have served to the west could conceivably have come within the sphere of the four henges at Priddy, each of c. 500 ft diameter.

There are of course other henges in Wessex, but they are all much smaller, less than 300 ft in diameter except for the second henge at Knowlton and Stonehenge itself. There is no reason to suppose that all henges had the same function, and the special astronomical

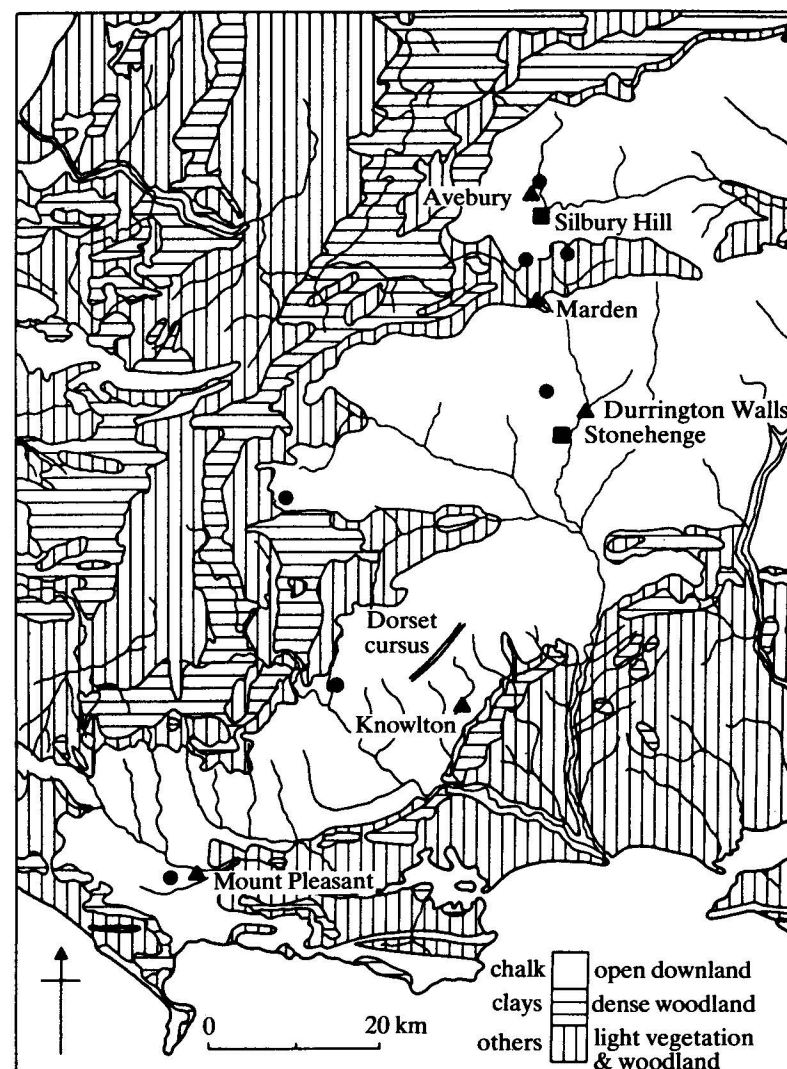


Figure 4. The major henge monuments of Dorset and Wiltshire (shown by triangles) in relation to the earlier neolithic enclosures (shown by circles). The large monuments at Stonehenge and Silbury Hill are also shown. Note that each area formerly served by a causewayed enclosure now has a major henge, except the west part of the Salisbury Plain, which is now apparently united with the eastern part.

significance of Stonehenge is well known, so that we may reasonably distinguish these from the major henges.

The Model Applied

On the basis of the proposed model (itself admittedly hypothetical) we can assert that each early neolithic region served by a causewayed camp was the home of an emerging chiefdom. Each had on the average 20 long barrows, which might suggest a population of between 400 and 2,000 persons. If we assume that one fifth of the population could be mobilised for public works for three months of the year, we have a potential annual work output of between 80,000 and 400,000 man hours. So a causewayed camp could be built in a single year.

It is just possible that the cursus at Dorchester in Oxfordshire was built during the early neolithic period (Atkinson, Piggott and Sandars 1951, 63) and it would certainly present a problem if the same were true of the Dorset and Stonehenge cursus. For the Dorset cursus would then reflect at least 25 years work. But in fact we know that the Dorset cursus was built in at least two, and perhaps in several stages. Moreover Leach (1959, 13) has rightly stressed that what seem today impressive and coherent achievements, reflecting perhaps the concept of a single mind, were often the result of accretions over many centuries. The same is true of Mediaeval cathedrals, and is of course now well documented for Stonehenge, although Silbury Hill was the result of a continuous process of construction. The early neolithic construction of cursus monuments would be more intelligible in these terms.

Turning now to the late neolithic period, we are perhaps entitled to think in terms of an increased population and a more developed social hierarchy. For certainly the carrying capacity of the land should have been greater than the population estimated so far. If we were to take a figure of 10 per km², and 1,000, 1,400 and 1,000 km² respectively for the Marlborough Downs, the Salisbury Plain and the Dorset chalklands, this would give us a total Wessex population of 34,000 persons. Each major henge would serve a population of about 5,000 persons, affording a possible annual mobilization of 1 million man hours. This was certainly sufficient to construct the henges. This was, of course, approximately the time of the supposed arrival of the 'Beaker Folk'. But until we know more of their settlement pattern and economy, it is preferable to think of their participating in the emerging social organization, rather than determining it.

For Silbury Hill, on the other hand, and especially Stonehenge III – for which the sarsen stones probably came from the Marlborough Downs anyway – we might well think in terms of further co-operation between the different regions, a 'confederation' like that of the Creek Indians in the eighteenth century. Or better, we might envisage the five Wessex chiefdoms coalescing into one greater chiefdom with five constituent tribes.

This would give a theoretical annual mobilization potential of 7 million man hours. But the concomitant redistribution to support the large work force would imply the transport of produce from south Dorset and the north Marlborough plains to the site of operations. Wheeled vehicles were not, it is thought, available, although river transport should not be ruled out since it was perhaps used for the Stonehenge bluestones (Atkinson 1960, 107). An increase in the size of the social unit, beyond a certain point and without corresponding technological advance, does not necessarily promote greater productivity.

Something of the same territorial pattern seems to have persisted into the early bronze age when Stonehenge III was probably built, although the major henges were perhaps no longer used. The evidence then is from burials, single graves under round barrows, some of them exceedingly rich (Piggott 1938). Fleming (1971) has recently studied the distribution of these barrows and established four particularly dense concentrations of them, with densities well above 6 per km², in regions which may be related to the four invariant traditions already recognized (figure 5): Maiden Castle/Mount Pleasant; Hambledon Hill/Knowlton; Robin Hood's Ball/Durrington Walls; and Windmill Hill/Avebury (figure 4). There is a lesser concentration some way east of Marden, and another near Whitesheet. But what emerges above all is the great concentration in the Stonehenge area and this was clearly the most important burial region. The force of Fleming's elegant analysis is incontrovertible, but it is unnecessary to draw on the hypothesis of a predominantly pastoral economy. The old regional patterns are still visible, and the Wessex early bronze age population preferred to give influential people burial near the centre of tribal areas, in the same way as they used to meet there at causewayed camps or henges. The special importance given to the Stonehenge area would support the tentative suggestion that the Salisbury Plain chief had by now become the paramount of a wider unit at the end of the neolithic.

On the basis of the field monuments of the successive phases in

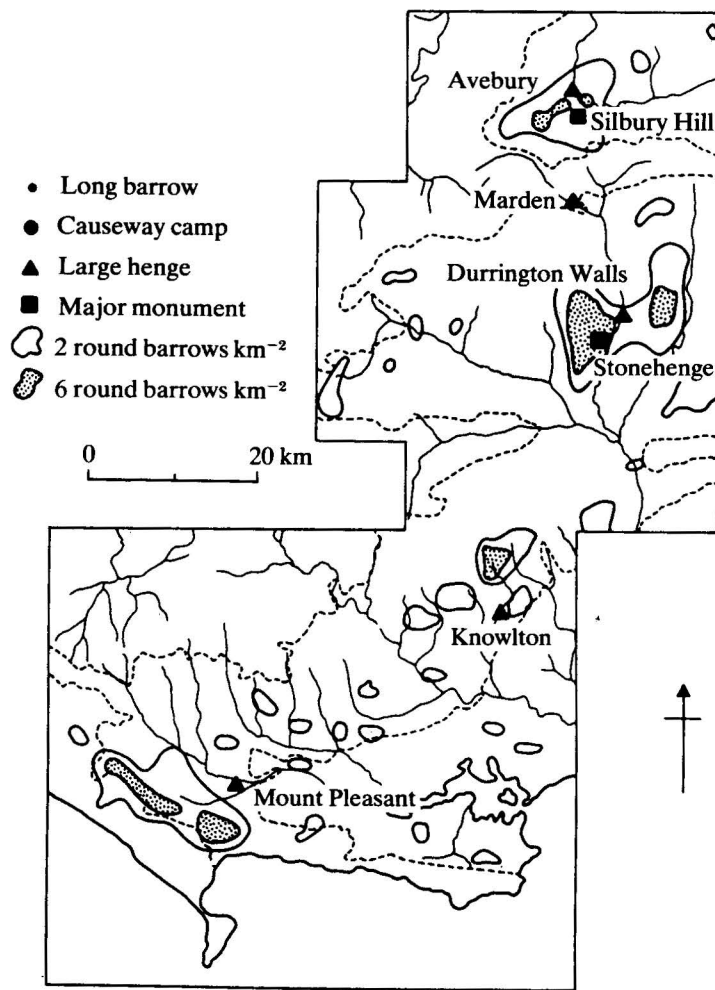


Figure 5. Distribution of the early bronze age round barrows on the chalklands of Dorset and Wiltshire (after Fleming 1971) in relation to the principal monuments of the late neolithic. The four main clusters suggest the persistence of regional divisions seen in figures 2 to 4.

Wessex, a hypothetical picture has thus been constructed of emerging chiefdoms in the early neolithic, developing to full scale chiefdoms at the time of the henges, and possibly to a single unified chiefdom with four or five sub-regions at the time of Silbury Hill or

Stonehenge III. This territorial pattern is still seen in the Wessex early bronze age (which may have been the period when Stonehenge III was constructed), but disappears from view in the later bronze age. (A surprisingly similar configuration re-emerges in the iron age, where it is documented by the hill forts. But occupation is by then no longer concentrated so exclusively upon the chalklands, so that a detailed comparison is not quite so striking.) It remains now to consider the relevance of the chiefdom model for features other than the distribution and scale of the monuments.

Specialization in the Neolithic

Several of the salient features of chiefdoms listed earlier are implied in the preceding discussion, and indeed implicit in the monuments themselves. The organization of public labour (14) on such a scale necessitated some measure of redistribution (2) of food, and some central, organized control (9), at least during construction, presumably vested in an individual (1).

In addition, the very great number of early bronze age barrows compared with those of the neolithic is at least suggestive of an increased population density (3), although not an incontrovertible proof. We should expect this on *a priori* grounds anyway, following the introduction of a farming economy at the beginning of the neolithic (cf. Atkinson 1968, 87). This, and the formation of larger territories documents an increase in the total numbers in the society (4). An increase in the size of individual residence groups (5) cannot yet be documented, although the central monuments increase in size.

One very important feature of the society not yet touched on is the existence of flint mines (Piggott 1954, 19 and 36f.) some of which lie inside our area. With their deep shafts they do imply some specialization, although not necessarily full-time. A radiocarbon date from the Easton Down mines puts their use back into the earlier neolithic period, and there are very early dates from Cissbury in Sussex.

Craft specialization (15) is implied here, sustained perhaps by the central organization, for the large scale of the operation makes freelance activity unlikely. Similar specialization outside our area is indicated by the very wide distribution of axes of igneous stones (Piggott 1954, 287f.) originating in axe-factories in western Britain. Pottery was also traded over great distances (Peacock 1969), as no doubt were the flint axes themselves (Sieveking *et al.* 1970).

In the case of the flint mines, which are inside the chiefdom

territory, it may be appropriate to speak of regional specialization within it, associated with redistribution (12). The mechanism for the movement or 'trade' of axes across territorial boundaries is less clear. Clark (1965) has suggested an inter-personal gift exchange, and this no doubt did occur. It would be possible also to suggest some additional and more highly organized mechanism for tribal exchange, using also the redistribution network already established within the territories by the chief for other produce.

The most obvious specialization, however, is in the use of some of the monuments themselves. Wainwright has written of the wooden rotundas in several of the larger henges (Wainwright 1970, cf. Piggott 1940) and very plausibly compared them with the council houses of the Creek and Cherokee Indians which are structurally very similar (giving a wooden prototype for the stone rotunds at Stonehenge). It is not stretching the limits of proper ethnographic comparison too far to suggest that their function may likewise have been as 'centres which coordinate social and religious as well as economic activity' (9). Religious specialization is now hardly to be doubted at the stone circles of Stonehenge and Avebury, and Alexander Thom (1967) has shown how the observations of the sun and moon at such sites was part of a calendrical interest seen (perhaps later) over much of Britain, especially in the highland zone. Even if the megalithic unit of measure was related to the pace or span rather than to a fixed universal standard (Hammerton 1971), there can be no doubting the precision and geometrical skill with which they were laid out. Nor do we need to see an analogue computer in the Aubrey Holes to accept the long and careful observation needed to set up the Station Stones and the Heel Stone at Stonehenge. Specialist observers or 'seers', in effect a priesthood (11), were a feature of this society, as in many others which were not yet civilization-states. Obviously periodic ceremonies and rituals took place (10), perhaps associated, as in Polynesia (Sahlins 1958) with periodic distributions of produce (see pp.212-13).

Parallels for the pre-civilization monuments of neolithic Wessex are not hard to find in several parts of the world. The impressive earthworks of the Ohio/Hopewell culture and of the succeeding Temple Mound period offer a number of resemblances. And, as we have seen, the large chiefdoms of their Creek and Cherokee successors constructed council houses closely analogous to the wooden henge rotundas of Wessex.

Neolithic Wessex society indeed displays many of the features seen in chiefdoms elsewhere, and as Kaplan has stressed (1963,

403): 'Just as we often underestimate the ability of many stateless societies to engage in large-scale communal production, so we often under-estimate the high degree to which they are able to specialize their labour on a part-time basis'. There is no need to insist on full-time professionals for any of these enterprises, despite the skill displayed. All of them were probably farmers as well, and there is no reason to suppose that anyone lived entirely from full-scale commercial enterprise or the 'profits' of trade in Wessex chiefdom society, which was still, at base, tribal.

Conclusions

It has been proposed that chiefdoms developed in Wessex during neolithic times. Using this notion, the size and distribution of the observed field monuments become intelligible, and they are seen as the natural counterpart of other features of the society.

The suggestion at once indicates some further approaches which, in a sense, could serve to 'test' the hypothesis. The first is the greater productivity (6) which is theoretically expected. If more settlements can be recognized and excavated, something further will be learned of farming methods. It may also be possible to follow up the intriguing suggestion of ploughing at this early time offered by the excavations at the South Street long barrow.

Secondly the predicted 'more clearly defined territorial boundaries or borders' (7) could be expected to have an influence both on artefact types and distributions. The recovery of more adequate pottery samples, again preferably by settlement excavation, and a systematic analysis, would be relevant here.

It should at once be admitted, however, that two important features of chiefdoms in some other areas are at present lacking. In the first place there is little evidence for ecological diversity (12). It may be that we should not regard the chiefdom territories as limited to the chalklands, although that is where their monuments lie, but imagine them as exploiting the heathlands on the sandy soils to the south and east, and the woodlands on the clays and oolitic soils to the west. If this could be demonstrated it would strengthen the application of the model.

Secondly, we have almost no direct evidence among the artefacts found (cf. Piggott 1954, *passim*) for personal ranking, as indicated by distinctive dress, ornament or possessions (18, 19). Only the beautifully worked jade axes and stone mace-heads, occasionally found, might indicate this. Dr Isobel Smith (personal communication) kindly points out that two of the three jade axes found in any

sort of context in south-west Britain were from causeway enclosures. Both were surface finds: one inside the enclosure on Hambleton Hill, the other from High Peak, Devon. One possibility is that such material signs as existed were of perishable materials. We could then argue that the finery of the Wessex early bronze age, seen in the rich burials, does not reflect a new attitude to personal ownership and display, but merely the greater opportunity for its expression offered by the development of metallurgy.

That would not be entirely convincing. It is wiser to admit that there may be different types of chiefdom society than to try to fit them all into the same mould. Otherwise the concept of chiefdom may become 'the ill-defined catchall' that Steward (1955, 53) derides in the notion of 'tribal society'. To use the model of chiefdom for societies such as neolithic Wessex will be useful only so long as it establishes meaningful relationships between hitherto unrelated features of them, and suggests a search for new regularities in the material. Once it has done so, like the 'three age system' for the classification of artefacts, it will have to make way for, or be refined to yield, subtler and less inclusive concepts. [1973]

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IV

SYSTEMS THINKING: THE EXPLANATION OF CONTINUOUS CHANGE

*

The task of analysing change, and if possible of explaining it, has always presented formidable problems to the historian. Most explanations seek to identify a principal causal factor, whose influence can be shown, ultimately, as of determining significance. The nature of the explanation offered thus depends upon the kind of causal agency which the analyst ultimately chooses to recognise as important. One school of workers will see environmental factors as of overwhelming importance, and lay stress on changes in climate. Another may see population as a crucial variable. A third will emphasise developing technology.

A multivariate procedure, where the interactions of a number of factors taken in conjunction are considered, can overcome the partiality of the 'significant factor' analysis, but it risks taking on an unmanageable complexity. The systems approach reduces to some kind of comprehensible order the multiple causal influences of interacting variables.

As is argued in chapter 12, the outlook advocated here does not amount to a closely integrated body of theoretical propositions which could reasonably be designated 'systems theory'. No such store of theoretical wisdom exists. Rather than 'systems theory', the approach presented here may properly be termed *systems thinking*. It is a method of analysis: a way of analysing a complex of interactions, in such a manner that its behaviour, which is often counter to one's expectations, and in that sense 'counterintuitive' (Forrester 1973), may be better understood. There is nothing particularly difficult about the approach – indeed one of the best introductions to it is found in C. H. Waddington's delightfully accessible *Tools for Thought* (Waddington 1977). His title is an apposite one. At the same time, however, the approach is sufficiently explicit that it can form a basis for quantitative formulations, such as that found in chapter 11.

Systems thinking, by introducing the notion of *trajectory*, the path through time of the society or other entity whose change is

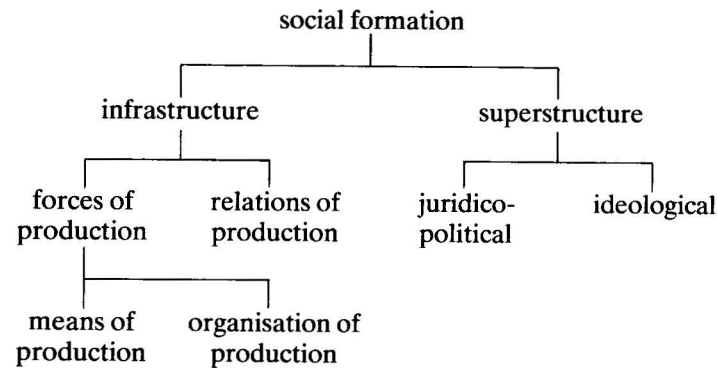
Systems Thinking: the Explanation of Continuous Change

under study, takes a considerable step towards a clear view, where the course of change may be conceived graphically. If we can describe the society at any given time by a large series of observations or measurements, then the observables to be measured are the *parameters* of the system. The changing values of those system variables effectively describe for us the successive *system states* through time. The working of the system can generally be broken down by the analyst into a number of *subsystems*. In each case a change in the *input* to a subsystem will produce a change in *output*. In most complex systems a change in the output results in a subsequent change in the input and there is *feedback*. If the system is self-regulating, it will act to oppose change: in such a case there is *negative feedback*. If the negative feedback is effective the system may achieve a kind of stability or equilibrium in face of small external changes, termed *homeostasis*. These various ideas, and a few more like them, offer a framework of analysis by which the very complex interactions in any living system can be broken down into a much more manageable series of individual actions and interactions, each of which we can consider in turn. We can do so without losing sight of the overall structure, within which each of these various interactions plays a significant but not necessarily determining role.

To my mind some analysis of this kind is absolutely indispensable if we are to focus our attention upon the various components or subsystems in turn. As discussed in chapter 9, the subsystems which one wishes to define for most societies will probably approximate more or less closely to the following:

- 1) subsistence
- 2) technological
- 3) social
- 4) cognitive/projective
- 5) external exchange
- 6) population (although this may be regarded not as a subsystem but as a parameter of scale).

It is instructive to compare this subdivision with the general analysis of society offered by Karl Marx, and most concisely set out in the Preface to *A Contribution to the Critique of Political Economy* (Marx 1859). This was a pioneering attempt to break down the complex whole into a number of intelligible components. It can be summarised in the following diagram, taken from Friedman (1974, 445):



Here the Marxist 'relations of production' correspond approximately with the social subsystem of the systems approach. The 'forces of production' correspond approximately to the subsistence and technological subsystems. The 'superstructure' corresponds approximately to the cognitive subsystem. It should be noted that the Marxist analysis does not put much weight upon external exchange, nor is population included as a parameter of scale as in the systemic approach set out in chapter 9.

When compared in this rather bald way, the two approaches have many similarities, although it has generally been held that Marx assigned a determining role to the economy – to the infrastructure. As Engels (1894) put it:

What we understand by the economic relations, which we regard as the determining basis of the history of society, is the manner and method by which men in a given society produce their means of subsistence, and exchange the products among themselves (in so far as division of labour exists) . . . It is not that the economic situation is cause, solely active, while everything else is only passive effect. There is, rather, interaction on the basis of economic necessity, which *ultimately* always asserts itself. No. Men make their history themselves, only they do so in a given environment which conditions it, and on the basis of actual relations already existing, among which the economic relations, however much they may be influenced by the other – the political and ideological relations, are still ultimately the decisive ones, forming the keynote which runs through them and alone leads to understanding.

It seems clear from this and other passages that Marx and Engels were reaching out towards a crucial concept which was not in fact to

be formulated clearly for another half century: the notion of *feedback*. Marx in several places, and Engels in the passage quoted, were at pains to stress the complexity of the interactions. Indeed it is fair to say that in some respects they anticipated a systems model. Certainly the whole rather fruitless argument among subsequent Marxists as to whether the 'infrastructure' does indeed hold the dominant role over the 'superstructure' is greatly clarified by a systems analysis in which the simultaneous interactions of the various subsystems can be viewed together. There is no need to label any one of them as 'dominant'. Some Marxist writers have indeed adopted the language of systems thinking to a large extent (Friedman 1974), speaking of the 'trajectory' of the system, and drawing diagrams of change which derive from the perspective of the systems analyst. Despite these borrowings they have hitherto tended to denigrate the systems approach as 'vulgar materialism'.

The central weakness of the Marxist analysis is not so much the description of the interacting components of society at a given point in time, but the failure to achieve a satisfying general description of their dynamic interactions. In saying this it is not my intention to belittle the contribution of Marx, for his analysis in terms of 'contradictions' was well ahead of his time and foreshadows in some ways the later systemic approach. But the concept has the overwhelming weakness that Marxist analysts have no criteria to offer by which these supposed 'contradictions' may be recognised other than by their *consequences*. In other words, in order to explain the state of the system at time *t*, we need not only to analyse the system at earlier points in its trajectory, but to have a knowledge of some future states of the system also. Such a framework of analysis dooms the Marxist historian to an unbreakable dependence upon hindsight. (The same difficulty, in effect, faces evolutionary theorists who place overmuch weight during their analysis upon the concept of 'adaptation'. For they rarely suggest how, at a given time, an organism may be judged to be well-adapted or ill-adapted to its specific environment, other than by evaluating whether it did or did not subsequently survive. The explanation offered for the present state of the system thus depends upon an evaluation of future states of the system.)

The systems approach, despite the rather rudimentary state of the art, certainly escapes from these very damaging limitations inherent in the key Marxist concept of 'contradictions' which by making the present explanation dependent upon future states of the system, invites all the criticisms of teleological explanation which

the advocates of historical inevitability have justly had directed at them.

It is important to stress, also, that despite the misapprehensions of some of its critics (and indeed some of its advocates also), the systems approach does not imply that the ultimate source of change necessarily lies outside the system. The system is not just a passive punch-bag, responding homeostatically to the buffets of environmental misfortune. This mistake has been made by such enthusiasts as Hill (1977) and Saxe (1977), who see the development in cultural systems as very much a pattern of environmental challenge and systemic response (to use in part the language favoured by Arnold Toynbee). But systemic change can involve the *internal* growth of complexity. A number of authors, notably Johnson (1982), have shown how simple increase in size can favour the development of such complex features as hierarchical structure, although simply to demonstrate which structures would promote an increase in efficiency and of visibility does not in itself explain how they arose.

That point, of course, approaches another criticism, directed at systems thinking, of what is often termed a 'functionalist' viewpoint, that is to say that the presence of various aspects of the archaeological record is explained by stating the function of each in the system as a whole (Giddens 1981, 16; Salmon 1982, 84 and 90). Others dismiss it as based upon an organic analogy, and hence subject to the limitations arising when any analogy is used beyond its proper scope of application.

Both these criticisms, however, seem to me somewhat misguided. It is, of course, perfectly true that all living beings and all communities of animals or plants, can usefully be looked at in systems terms. Notions such as homeostasis and morphogenesis are very relevant to their understanding. It is true also that organic analogies can be very misleading: to talk, for instance of the birth and death of civilisations or institutions is to imply that they behave in the same way as living things, with a definite and predictable life cycle. This is not necessarily true, and the point at which Greek civilisation, for instance, 'passed away' is purely a matter of definition. While in political terms it was certainly eclipsed by the expanding Roman empire, in other ways it did not terminate and it is perfectly possible to see the modern Western world as part of a coherent process of development which can be traced back to that time. To speak of the birth and death of cultures, then, is to use a rather arbitrary model. Indeed the use of this unsatisfactory analogy as an integral part of the structure of his work is, I believe, the main reason for the failure

of Arnold Toynbee's *A Study of History* (Toynbee 1946) to make any very significant contribution to his chosen subject. But while the organic analogy – like any analogy – can be misleading, it is important to stress that a systems model is not really an analogy at all. That is to say it does not imply an equivalence or resemblance with any specific existing entity. Instead it sets out to postulate a series of explicit relationships. These may or may not be suitable for the explanation of the chosen case, but there is nothing analogical about them. If systems defined in this way show properties which can be seen also in living systems, this must be because the mechanisms suggested actually produce the behaviour seen in those systems. To the extent that there seems to be an analogy, the systems model is to be respected for generating the appropriate behaviour, or to be rejected if its behaviour does not in fact resemble that of the human group or whatever which one is seeking to understand.

I believe that Salmon is in error when she implies that systems explanations are inherently functionalist. They simply define processes and relationships which can be shown to generate a range of behaviour. The present state of the system can in this way be shown to be the natural outcome of past states of the system and of the various forces acting upon it. Certainly many systems act homeostatically: that is to say that they act in such a way as to keep various variables of the system within certain limits. But the systems analysis often has the object of investigating the various processes which work together with this end result. The aim is often to show how such apparently goal-seeking or equilibrium-maintaining behaviour is the predictable product of definable processes which in themselves are neither goal-seeking nor equilibrium-maintaining. A systems approach, far from being inherently 'functionalist', in this sense actually removes the obligation to think in terms of functions or goals. Instead the analysis seeks to show, by making explicit the workings of the system, how such properties are a natural and predictable result of its constituent relationships and processes.

The systems approach was first introduced to archaeology, in a very general way, by Lewis Binford (1965). It was, however, David Clarke who first employed the wider range of vocabulary then familiar from the field of cybernetics (Clarke 1968, 101), and who offered a concise outline of the analysis of systemic change which remains in many ways the best introduction. Kent Flannery (1968) took a specific instance, the origins of agriculture in Mesoamerica, and showed how the perspective could clarify the interactions of

some of the processes at work. In 1972 in my book *The Emergence of Civilisation* I set out to apply the approach for the first time to the origins of complex society, taking a specific case – the bronze age Aegean – and giving a detailed consideration of the archaeological evidence for each subsystem. The introductory and concluding chapters of that analysis (with several omissions) are given below. The book's greater contribution, however, was to take each of the subsystems in turn, and to discuss the available data in some detail from the perspective of each. This systemic treatment of an individual complex society has not yet been followed up in a comprehensive way by detailed application to another comparable instance.

The two chapters which follow thus formed part of a sustained attempt to describe the development of one particular complex society, that of the early Aegean, in terms of processes which were both intelligible and locally operating. As I have emphasised throughout this book, and as others have recently stressed (e.g. Binford 1983, 392), it is appropriate to look at each attempt at archaeological explanation in terms of the context of its time. When these chapters were written, it was widely assumed that complex society in the Aegean could satisfactorily be explained simply by means of detailing its relationships with its contemporaries and predecessors in Western Asia. One main aim of the exercise was thus to show that a coherent, alternative explanation, without unduly emphasising that aspect, was indeed possible. At the time, to do that seemed an important task, and I believe that it was a necessary enterprise. That having been accomplished, a fresh attempt today would set more emphasis upon social and political factors, especially in Crete. It might well emphasise the crucial nature of the transition there to the first palaces in what was probably a rather short space of time. And it would need to acknowledge what now seems to have been the initiatory role of north-west Anatolia in metallurgical developments in the Aegean towards the end of the third millennium BC. There is, of course, a very long way to go before one could feel that the explanation would be a very satisfying one for Aegean civilisation. But part of the interest, I hope, of these papers is that they offer an exemplification of what is in some respects a general model for the development of complex society. What in some ways it lacks is *specificity*: a convincing identification of precisely those factors which were of dominant importance in the Aegean case. On the other hand it does make reference to the very wide range of factors which will to some extent be relevant to every case of the early development of complex

society. And it does go on to open the way to more explicit, and quantitative, modelling procedures.

The two alternative scenarios offered in 'The Multiplier Effect in Action' (chapter 10) have sometimes been seen, perhaps by readers wearied by the preceding 470 pages, as once again offering two favoured explanations where the crucial variables are once again singled out. But the real point of the chapter is to show how the different elements can be brought together and expressed simultaneously in the form of a matrix.

At that time I did not have the familiarity with the world of computing to produce an algorithm by which the proposed matrix could be operationalised. My collaboration with the mathematician Kenneth Cooke, and the helpful advice of Robert Rosen, allowed us to experiment with the operation of such a matrix by means of a computer simulation (chapter 11).

It must at once be admitted that the attempt at simulation set out in chapter 11 is so simple, and in that sense so crude, that it could never satisfactorily model the complexities of any specific case. It is not illuminating for the Aegean as such because it has not had built into it to a sufficient degree the various particularities of that specific example. But by its simplicity it does bring out some of the features – and the difficulties – inherent in any modelling exercise of this kind.

At a certain level this experiment of computer simulation was nonetheless extremely rewarding: it was fascinating to see on the display screen the successive steps plotted out for the state variables relevant to each of the subsystems as the system simulation proceeded through time. This is, of course, the general approach employed by the System Dynamics modelling group at MIT inspired by the work of Forrester (1969). In both cases the system proceeds through successive states, the values at one time determining those at the next time point. Similar models underlie most of the economic forecasting procedures currently employed. Gerardin (1979) for example, has used his experience of this kind of modelling to discuss the problems of simulating the trajectories of past societies. Zubrow has gone so far as to take one of the Forrester urban models and apply it directly to ancient Rome (Zubrow 1981). But although the simulation approach can very effectively model the developments within the system in response both to external change and to internal growth, and in doing so produce some interesting and sometimes counter-intuitive behaviour, this does not allow for the internal re-structurings and the various innovations of a social as

well as a technical nature, which lie at the root of long-term change in any society.

The problem of modelling long-term change is discussed in 'The simulator as demiurge' (chapter 12), where I speculate about the much more ambitious models which would be necessary before such innovative behaviour could be incorporated into the simulation. This is, however, a problem which is very widely felt in the wider field of simulation and computer studies at present. Artists are devising programmes which allow drawings to be produced by the computer in what are, in effect, simulations (Cohen 1983), and the question of creativity can be seriously discussed in this context (Boden 1983). There is a general analogy here between creativity in this sense (and artificial intelligence also) and the innovative development of new forms, whether in biological evolution or in social development, which one might hope one day to simulate.

Nor is it inevitable that the systems approach be an altogether impersonal one. Admittedly the existing analyses in the field of archaeology have tended to operate at the scale of the society as a whole, and so to lose sight of the individual actor. But it would be perfectly possible to construct models in which the reactions of individuals and of groups of individuals were taken into account at each point. Indeed Doran (1982) has already taken some first steps in that direction. But at the same time it is important not to overlook the overall effects of a great complexity of interactions, which often have outcomes altogether unexpected to the actors, and indeed can be 'counterintuitive.'

The systems approach is still relatively new to archaeology. As I have tried to show, it now offers us the opportunity of clarifying aspects of our thought, without any necessary consideration of quantification. Its great promise for the future, however, is that systems thinking is indeed the logical first step towards computerised modelling, for only the computer has the vast capacity necessary to model the numerous complexities of human society. The instrument is there. It is up to us as archaeologists to develop theories and models which escape some of the naivetés and imperfections of the existing attempts at simulation, and to use the computer informatively. The hardware offers the opportunities, but it cannot provide the answers. Only the archaeologist can do that.

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